CONCEPT

Optical Transport and Broadband Access Networks: DWDM, OTN and GPON FTTH Design

9 – 13 August 2027
London - Central London four-star



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Introduction:

Optical transport and broadband access networks now carry fixed broadband, enterprise and mobile traffic on the same fibre, yet many operators still plan DWDM line systems, OTN switching layers and GPON access areas in separate teams with separate spreadsheets. The result is stranded wavelengths, congested OLT uplinks and protection schemes that fail under dual faults. This Core Concept course teaches transmission and access engineers to design the carrier network end to end, from the PON serving area through aggregation to the wavelength core. Each participant builds an FTTH Access Area and Transport Backhaul Design.

Course Objectives:

- Structure a carrier network into access, aggregation and core layers and assign DWDM, OTN, packet and PON technologies to each layer
- Engineer DWDM line systems on the ITU-T G.694.1 grid with amplifier placement, ROADM degrees and dispersion and OSNR checks
- Plan OTN multiplexing and switching per ITU-T G.709, mapping client services into ODU0 to ODU4 and ODUflex containers
- Select protection and restoration schemes that meet service availability targets across ring and mesh transport topologies
- Design GPON and XGS-PON serving areas with split ratios, optical budget classes, OLT port sizing and take-up assumptions
- Produce an FTTH Access Area and Transport Backhaul Design with a capacity forecast and an operations and fault management model

Target Audience:

- Transmission engineers responsible for DWDM line systems, wavelength services and OTN switching layers
- Access network planners who design PON serving areas, OLT placement and FTTH rollout phases
- Network architects who set the layering between optical transport, IP/MPLS aggregation and broadband access
- Capacity planning engineers who forecast traffic growth and schedule wavelength, port and chassis upgrades
- Network operations centre engineers who manage transport and PON alarms, faults and service restoration
- Mobile transport engineers who carry backhaul and fronthaul traffic over shared optical infrastructure

Course Outline:

Day 1: Carrier Network Layers and Optical Transport Landscape

- Access, Aggregation and Core Layer Model for Fixed and Mobile Operators
- Traffic Drivers: Residential Broadband, Enterprise Ethernet, Data Centre Interconnect and Mobile Backhaul
- Transport Technology Map: DWDM, OTN, Packet Optical and IP/MPLS Roles
- CWDM on the ITU-T G.694.2 Grid Versus DWDM for Metro and Access Rings
- Current Network Inventory Review: Wavelength Fill, Port Utilisation and Layer Gaps

Day 2: DWDM Line Systems and OTN Architecture

- ITU-T G.694.1 Fixed and Flexible Frequency Grid and Channel Plan Design
- EDFA and Raman Amplification, Span Loss and Amplifier Chain Placement
- ROADM Architectures: Colourless, Directionless and Contentionless Add/Drop Degrees
- ITU-T G.709 OTUk Frame, Overhead Bytes and Forward Error Correction
- ODU0 to ODU4 and ODUflex Client Mapping and Multiplexing Hierarchy

Day 3: PON Access Engineering and FTTH Serving Area Design

- ITU-T G.984 GPON Transmission Convergence, T-CONTs and Dynamic Bandwidth Allocation
- ITU-T G.9807.1 XGS-PON and ITU-T G.987 XG-PON Coexistence on One ODN
- ODN Topology Choices: Centralised Versus Cascaded Split and Split Ratio Selection
- Optical Budget Class Check From OLT Port to Furthest ONT
- ONT Service Provisioning and Management Through ITU-T G.988 OMCI Profiles

Day 4: Survivability, Aggregation, Capacity and Operations

- Linear, Ring and Shared Mesh Protection Versus Control-Plane Restoration in OTN Networks
- Chromatic Dispersion, OSNR Margin and Coherent Transponder Reach Trade-Offs
- IP/MPLS Aggregation, OLT Uplink Dimensioning and Mobile Backhaul and Fronthaul Overview
- Capacity Planning Model: Busy-Hour Demand, Wavelength Fill Thresholds and Upgrade Triggers
- NOC Fault Management: Alarm Correlation, Root Cause Isolation and Service Impact Mapping

Day 5: Capstone: FTTH Access Area and Transport Backhaul Design

- Capstone Build: Serving Area Demand, Homes Passed and Take-Up Scenarios
- Capstone Build: PON Split Plan, OLT Sizing and XGS-PON Upgrade Path
- Capstone Build: Aggregation and DWDM/OTN Backhaul Ring With Protection Scheme
- Capstone Build: Five-Stage Capacity Forecast and Operations Handover Checklist
- FTTH Access Area and Transport Backhaul Design Presentation to a Technical Review Panel

Skills You Will Gain:

- Carrier Network Layering
- DWDM Channel Planning
- OTN Multiplexing Design
- Transport Survivability Engineering
- PON Serving Area Design
- Broadband Capacity Forecasting
- Optical Alarm Correlation
- Mobile Backhaul Dimensioning

Why Attend This Course:

- Return with an FTTH Access Area and Transport Backhaul Design built around a serving area from your own network
- Connect PON access decisions to the aggregation and wavelength capacity they consume upstream
- Test protection and restoration choices against dual-fault and upgrade scenarios before they reach the live network
- Compare transport and access practice with engineers from incumbent carriers, wholesale fibre operators and mobile networks

Conclusion:

Broadband growth now depends on access, aggregation and optical transport being planned as one system. The course moves from carrier network layers and the transport technology map, through DWDM line systems and ITU-T G.709 OTN architecture, to GPON and XGS-PON serving area design, then protection, aggregation, capacity planning and fault management. The final day applies these methods in a modelling build that produces an FTTH Access Area and Transport Backhaul Design ready for technical review.